

REMARKS/ARGUMENTS

Status of Claims

The Office Action mailed November 18, 2004 has been reviewed and carefully considered. Claims 1-15 are pending in this application, with claims 1-3 being the independent claims. Applicants acknowledge the Examiner's indication that claims 3, 6, 9, 12, and 15 are allowed. With the current amendment, claims 1 and 2 have been amended, claims 7 and 8 have been canceled, and claim 16 has been added. Reconsideration of the above-identified application, in view of the above amendment and the following remarks, is respectfully requested.

Overview of the Office Action

Claims 1, 2, 7, 8, 10, 11, 13 and 14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,473,584 to Hibino et al. (hereinafter "Hibino") in view of Japanese Patent No. JP 07-253705 to Ogiri et al. (hereinafter "Ogiri"). Claims 4 and 5 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Hibino in view of Ogiri, and further in view of U.S. Patent No. 6,249,664 to Sato (hereinafter "Sato").

Title

The Examiner has indicated that the title of the specification is not descriptive. Applicants have replaced the title with a suitable new title.

Descriptive details of invention embodiments

The following details are based on the specification and are provided only for the convenience of the Examiner as part of the discussion presented herein. Such details are not intended to argue limitations which are unclaimed.

It is known to use a toner density sensor to keep the toner density of a developing agent constant (see page 2, lines 3-8 of the present specification). However, as carrier particles are used which have smaller and smaller diameters (to prevent toner scattering and fog - see page 1, lines 16-23) the fluidity of the developing agent decreases and this interferes with the ability to control toner density with the toner density sensor (see text bridging pages 2-3).

One aspect of the present invention relates to an image forming apparatus that has a toner density sensor which detects changes in the permeability of the developing agent. Also, this aspect of the invention combines a supply/convey member having a diameter of not less than 23 mm with a carrier average particle diameter of not more than 50 μm and not less than 20 μm (as recited in amended independent claim 1).

Independent claim 2 combines the feature of the carrier average particle diameter ("Rc") being not more than 50 μm and not less than 20 μm with the feature of a specified relationship between Rc and the diameter of the supply/convey member.

Patentability of claims over prior art

Hibino discloses an image forming apparatus including a developer container (27) for developing an electrostatic latent image on a photosensitive drum (3) by using a two-component developing agent containing polymerized toner. The developer container (27) comprises a

carrying screw (24) in the form of a spiral screw which conveys the two-component developing agent in an axial direction while agitating the developing agent, wherein the carrying screw (24) has a diameter of 10-25 mm (col. 7, lines 36-37, as relied upon in the Office Action). However, amended independent claims 1 and 2 recite a toner density sensor for detecting a change in permeability of the developing agent within the image forming apparatus. Hibino fails to teach or disclose this feature, as conceded by the Examiner.

The features of applicants' independent claims 1 and 2 that are not present in Hibino are also not present or suggested in Ogiri, and even if they are, there is no disclosure or suggestion in either Hibino or Ogiri to combine them to result in the invention recited in applicants' independent claims 1 and 2.

Ogiri teaches an image forming apparatus including a permeability sensor 440 that is used to detect toner density. However, Ogiri does not address the problems associated with use of a carrier having a reduced particle diameter.

A person of ordinary skilled in the art would have no motivation to combine Hibino with Ogiri in the way proposed in the Office Action. The Examiner's statement that modifying Hibino with the toner density sensor of Ogiri is obvious "to manage the toner concentration..." is mere conjecture. The reason for combining the various claimed features of the present invention is because of the above-mentioned problem it addresses which is caused by the reduced average diameter of the carrier particles. Such a problem has not been recognized, let alone addressed, by the applied references.

Recognition of the problem being solved is important when considering the issue of obviousness under 35 USC 103. There is a line of CAFC cases dealing with the relevance of the

problem being solved in determining obviousness. In re Dillon, 892 F.2d 1554 (Fed. Cir. 1989).

The cases hold that "A patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified." In re Sponnoble, 160 USPQ 237 (CCPA 1969). In re Wright, 848 F.2d 1216 (Fed. Cir. 1988) states the following:

"The determination of whether a novel structure is or is not 'obvious' requires cognizance of the properties of that structure and the problem which it solves, viewed in light of the teachings of the prior art." (emphasis added).

It is respectfully submitted that this aspect of the case law has not been considered in formulating the obviousness rejection. Its fair applicability must lead to a conclusion of unobviousness of the invention over the applied references.

Sato teaches a developing apparatus for developing an electrostatic latent image on a photoreceptor having two rotors for agitating and conveying developer. Sato does not bridge the gap between the present invention and the combination of Hibino with Ogiri.

For all the reasons given above, amended independent claims 1 and 2 are patentable over Hibino, Ogiri and Sato when applied singly or in combination.

Each of claims 4, 5, 7, 8, 10, 11, 13 and 14 depends from one of allowable amended independent claims 1 and 2 and, thus, benefits from the allowability thereof.

Based on all the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

It is believed that no fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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